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**Reconstitution, Research
and Development:
From Swords to Plowshares
and Back Again**

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Abstract

RECONSTITUTION, RESEARCH AND DEVELOPMENT: FROM SWORDS TO PLOWSHARES AND BACK AGAIN

Dr. Mark L. Montroll

The current global political environment is unclear and difficult to assess. The future is incomprehensible and unpredictable. Yet, in spite of this uncertainty, the U.S. defense establishment, reacting to the disintegration of the threat posed by the Soviet Empire, is being radically reduced and restructured. Even as defense spending is diminished and the United States turns its attention toward strengthening its economy, the National Security Strategy of the United States contains a policy requiring the country to retain the capability to reconstitute its military forces to protect its national interests if they are threatened in the future.

In this paper, the concept of reconstitution of forces is reviewed in its historical context, defined in its current military context and described in its role of reducing risks associated with making defense-related policy decisions. Finally, the concept is exemplified with a discussion of a scenario in which the Carderock Division of the Naval Surface Warfare Center, the Navy's shipbuilding and logistics research and development center, is transferred to the Department of Commerce, under the command of a NOAA Captain. In this manner, the United States can affordably enhance the country's economic and social prosperity while simultaneously perpetuating the capability to reconstitute its military forces for future generations.

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PROLOGUE

The state of the great ships was more deplorable than anything Pepys could have conceived. There they lay, the very flower and heart of his cherished Navy. Dutch guns could have done no more to them than the neglect and corruption of the politicians. Their buttocks, bows and quarters were soft with decay, their tree-nails burnt and rotten, the planks started from their transoms and ready to drop into the water. Some were in actual danger of sinking at their moorings. Patched with canvas and shotboard to hide their nakedness, they reminded Pepys of the battered ships he had so often seen returning from battle. Yet the only battle of their brief, bloodless history had been that which he himself had waged on the floor of the House for their laying down. Such seemed the end of the stately ships of the line which he had conceived and planned to give his country an enduring ascendancy over her rivals and the permanent command of the seas.¹

So stood the remains of the what once was the pride of England and envy of the world -- the British fleet -- on August 12, 1684, the day the Duke of York and the recently reinstated Secretary of the Admiralty, Mr. Samuel Pepys, visited Chatham Yard.

When he had been driven from his post he had left to his successors a fleet of 76 ships at sea and 12,000 men in pay, equipped for war and with stores enough to set out the remainder in any emergency. Now, apart from a small peacetime establishment of a score of frigates and two or three fireships, manned by just over 3,000 men, the Navy had ceased to exist as an effective force in the affairs of Europe. For the rest of the fleet, after five years of neglect, was literally rotting in harbour. So hopelessly was it out of repair that, according to its own Surveyor, it could not even be made to float without a preliminary expenditure of about £120,000. The Navy debt had increased from £305,000 to £384,000. And the stores were empty.²

Mr. Pepys spent the next year organizing the process of rebuilding the fleet. Finally in November 1685, having secured the necessary funds from the Treasury, he called upon one of England's master shipbuilders, Sir Anthony Deane, to take on the task. Sir Deane readily agreed, writing, "For if the Navy which is the strength of the nation shall fall under such a degree of decay as to fail us in case of any sudden attempts from our neighbours, at whose pleasure it lies to . . . break the peace any day of

¹ Bryant, Arthur. Samuel Pepys. The Saviour of the Navy. Cambridge, England: The University Press, 1947, p 95.

² Bryant, Arthur. Samuel Pepys. The Saviour of the Navy. Cambridge, England: The University Press, 1947, p86.

the year, we may repent overlooking this great work when it may be too late."³ For an annual sum of £400,000, Sir Deane offered not only to repair the entire fleet within three years but also to immediately equip an adequate peacetime guard with an establishment of 4,000 men in the winter and 6,000 men in the summer.

After five months of intense negotiating, Mr. Pepys convinced the Parliament, the Lord Treasurer and the King to accept his proposal. On Saturday April 17, 1686, Sir Deane and his commissioners took over the responsibility of "building, repairing and equipping ships and Yards, the recruiting and payment of officers, seamen and workmen, and making of surveys, estimates and contracts."⁴ On that day the process of **reconstituting** the English Navy began.

The Navy reconstituted to its former power would serve England well for the next 250 years. From this maritime base of power, England would gain and hold the titles "Ruler of the Waves" and "Mistress of the Sea" until the mid 1900s. During the 1930s, it would voluntarily relinquish some of its stature through mutual disarmament agreements so as not to appear as a hegemonious power that could cause others to build up their defenses. In addition, its supreme superiority would be challenged and diminished by the rise of the navies of Japan, the United States and Germany. Until then, England would reign supreme.

INTRODUCTION

Although the world of the 1990s is vastly different from that of the 1680s, many defense issues remain the same. How much of the national treasury should be spent on defense? How much defense is really needed? And, how can risk be minimized if the answers to the first two questions prove to be incorrect, or if there is a sudden change in the world's circumstances?

³ Bryant, Arthur. Samuel Pepys. The Saviour of the Navy. Cambridge, England: The University Press, 1947, p 139.

⁴ Bryant, Arthur. Samuel Pepys. The Saviour of the Navy. Cambridge, England: The University Press, 1947, p 160.

It is this third question that I will examine in detail in this paper. I will first review the concept of **reconstitution** of forces by (1) discussing its historical context; (2) defining the differences between the reconstituting, mobilizing and surging of military forces; and, (3) describing the role reconstitution has in reducing the risks inherent in making defense-related policy decisions.

I will then apply these concepts to describe how defense-related research and development policies can be made that support the long-term national security priorities of the United States. I will examine how one of the Navy's shipbuilding and logistics research laboratories could be restructured in a fashion which cost effectively supports the Navy's declining requirements for research while maintaining the expertise and facilities necessary for the Navy to reconstitute its forces in the future.

RECONSTITUTION

Since the destruction of the Berlin Wall in 1989 and the disintegration of the Soviet Empire in 1990, the threat to world stability has changed dramatically. No longer does Western Europe or the U.S. think or act as if it may be attacked at any moment.

The predominant threat of the past 40 years, as embodied by the Soviet Empire, has been significantly diminished. However, the world remains an inherently dangerous place. Ethnic strife, economic disparities, world hunger and poverty, general international chaos and the raw quest for domination and power by a few overzealous despots continue to threaten and breach the peace and tranquility of the world.

In 1991, the U.S. responded to the confluence of this changing world environment and its own economic recession by reexamining its national security strategy and policies. As a result, the 1991 National Security Strategy of the United States included the passages:

In the face of competing fiscal demands and a changing but still dangerous world, we have developed a new defense strategy that provides the conceptual framework for our future forces. This new strategy will guide our deliberate reductions to no more than the forces we need to defend our interests and meet our global responsibilities.

The four fundamental demands of a new era are already clear: to ensure strategic deterrence, to exercise forward presence in key areas, to respond effectively to crises and to retain the national capacity to reconstitute forces should this ever be needed⁵

This difficult task [reconstitution] will require us to invest in hedging options whose future dividends may not always be measurable now. It will require careful attention to the vital elements of our military potential: the industrial base, science and technology, and manpower.... We will now have to work much more deliberately to preserve them.⁶

And, the 1992 National Military Strategy of the United States, supporting this policy, stated:

As we reduce the size of our military forces in response to the demise of the global threat, we must preserve a credible capability to forestall any potential adversary from competing militarily with the United States. This "Reconstitution" capability is intended to deter such a power from militarizing and, if deterrence fails, to provide a global warfighting capability. Reconstitution involves forming, training, and fielding new fighting units. . . . Reconstitution also involves maintaining technology, doctrine, training, experienced military personnel, and innovation necessary to retain the competitive edge in decisive areas of potential military competition.⁷

The challenge has now been passed to those who must carry out this reconstitution policy to interpret it and to create programs that implement it.

History

The concept of reconstitution of forces is neither new nor unique to our times and situation. As illustrated in the prologue of this paper, following the defeat of the Spanish and Dutch in the mid 1600s, England neglected her Navy and allowed it to atrophy to the point of uselessness. The world seemed secure and the people of England were no longer interested in spending vast sums of money for its upkeep. Recognizing England's vulnerable position, and able to influence the newly crowned King James II to accept his vision, Mr. Pepys set about to reconstitute the Navy, and thereby reconstituted the power base upon which England would depend for the next 250 years.

⁵ The White House, National Security Strategy of the United States. August 1991, p 25.

⁶ The White House, National Security Strategy of the United States. August 1991, p 29-30.

⁷ Chairman, Joint Chiefs of Staff, The Department of Defense. National Military Strategy of the United States, January 1992, p 7-8.

Examples of reconstitution of military forces can be traced back to well before even Mr. Pepys' time. According to the Bible, the prophet Isaiah, who lived around 740 BCE, saw these words of the Lord in a vision:

And they shall beat their swords into plowshares,
And their spears into pruninghooks;
Nation shall not lift up sword against nation,
Neither shall they learn war any more.⁸

Yet only 100 years later, around 626 BCE, the prophet Jeremiah was told by the Lord in a vision:

Make ready buckler and shield,
and draw near to battle.
Harness the horses, and mount ye horsemen,
and stand forth with your helmets;
Furbish the spears, put on the coats of mail.⁹

For more modern examples, one need only look at the beginning of World War II, and even more recently, the 1980s. When discussing the U.S. position at the beginning of World War II, Irvin Stewart wrote:

During the two decades between the end of World War I and the beginning of World War II, the people of the United States had pinned their faith on the impossibility of another world war. . . . Appropriations for military purposes were relatively small as the American people nurtured the fond hope that by its action the United States could set an example of small armaments which would be followed by the rest of the world. . . . It was apparent . . . in the spring of 1940 that the United States was in imminent danger of being forced into a war for which the country was pathetically unprepared from the standpoint of new weapons.¹⁰

Just five years ago, John Lehman, then Secretary of the Navy, observed:

In the years immediately following World War II, the navy basked in the deserved glory of the greatest naval victory in recorded history. . . . Ironically, it was the very magnitude of the navy's victory at sea that began its equally historic postwar decline. . . .

In the 1940s we had several hundred shipyards On the day of Pearl Harbor we were already geared up . . . and were producing one ship a day. . . . During my tenure as secretary of the navy I visited most

⁸ The Bible. Book of Isaiah, Chapter 2 Verse 4.

⁹ The Bible. Book of Jeremiah, Chapter 46 Verses 3-4.

¹⁰ Stewart, Irvin. Organizing Scientific Research for War. Boston: Little, Brown and Company, 1948, p 3.

of the ports around this country that produced those prodigies for the arsenal of democracy. Those shipyards and that industrial base are gone forever. In ports such as Boston, New York, [and] Philadelphia . . . where those building ways and graving docks used to be, now stand Marriott Hotels, parks, and low-cost housing. As of this writing instead of producing one ship a day, we are producing less than one merchant ship a year, and that only because of continuing subsidies.¹¹

In all these examples, after the country's military ended a war victoriously, the nation no longer felt threatened and allowed its military to atrophy -- only to discover at some time in the future, they were once again threatened and needed to reconstitute their former power base to protect their national interests.

The United States is currently entering a similar situation -- but with one significant difference. The starting point is similar: the country no longer feels imminently threatened and is therefore significantly reducing its military power base. But now, as a matter of formal policy, the United States is recognizing and acknowledging that the time may come in the future when it will need to reconstitute its military power base in order to protect its national interests. It is too soon to tell if the country will back up its stated National Security Strategy and National Military Strategy with the appropriate resources and programs.

Definitions

In order to implement this reconstitution policy, a clear definition of reconstitution and its relationship to military capability must be developed. The term reconstitution has only recently been applied to the military. It was first mentioned by President George Bush in a speech in Aspen, Colorado.¹² Because its use is so new, it is just beginning to be integrated into the military planning process. Its integration is difficult, in part, because it is confusing to distinguish between reconstitution and mobilization, a common military term of art that is well established in military doctrine.

¹¹ Lehman, John F., Jr. Command of the Seas. New York: Charles Scribner's Sons, 1988, p. 93 & 170.

¹² Bush, George, President of the United States. "United States Defenses." Speech delivered at the Aspen Institute, Aspen, Colorado, August 2, 1990.

The distinction between the two concepts can be easily understood by examining their definitions.

Three basic concepts are surge, mobilization and reconstitution. These terms can be defined as follows:

Surge is not a term of art, but discussed so that the complete spectrum of military build-up can be understood. Surge is the first level of build-up. As applied to the military, surge can be defined as: *the act of assembling and organizing the resources of the Department of Defense to meet extraordinary requirements*. The broad goal is to bring the resources of the department to bear on a specific problem.

Mobilization is a term of art well integrated into military doctrine. It is defined and discussed in great detail in Joint-Pub 0-1, Basic National Defense Doctrine¹³. It states: "In the general sense, mobilization is government intervention in the national economic process to meet extraordinary requirements. It is defined as *the act of assembling and organizing national resources to support national objectives in time of war or other emergencies*. . . . The broad goal is to bring the strength of the nation to bear on the problem." Mobilization may take place on three levels -- partial, full or total. Partial and full mobilization involve assembling and organizing all existing elements of power at varying levels, while total mobilization involves expanding the existing power base by creating additional sources of power sufficient to meet the needs of the emergency.

Reconstitution is a word specifically used in the National Security Strategy of the United States and numerous supporting documents. It has not yet, however, been used long enough or defined well enough to be considered a term of art. As applied to the military, reconstitution can be defined as: *the act of rebuilding the nation's power base, which was reduced as a result of diminished current demands and future expectations, to a level necessary to meet emerging increased demands*. Reconstitution may take place in anticipation of or preparation for war as part of the "total mobilization" process, or it may take place during peacetime in response to a shift in the power differential

¹³ U.S. Department of Defense. "Basic National Defense Doctrine." Joint Pub 0-1, Proposed Final Pub, May 7, 1991.

between a nation's military capability and the demands placed on it.

Role of Reconstitution

The role of reconstitution can be expressed in two different contexts: the "act of reconstitution," and the "ability or capability to reconstitute."

The role that the act of reconstitution plays in the United States' national security strategy is to rebuild the nation's military capability to a level necessary to meet an emerging increased demand in time to use it effectively. The National Military Strategy of the United States contends: "Reconstitution involves forming, training, and fielding new fighting units."¹⁴ The National Security Strategy of the United States declares: "Beyond the crisis response capabilities provided by active and reserve forces, we must have the ability to generate wholly new forces should the need arise."¹⁵ The act of reconstitution is the act of generating these wholly new forces.

Acquiring the ability and retaining the capability to reconstitute is much more significant to the national security strategy than simply the act of reconstitution. This capability serves three distinct functions:

1. It provides a justification, a framework, and a set of rules for military planners and government officials as they reduce the military power base of the country as a result of diminished current demands and future expectations. As stated in the National Security Strategy, "The ability to reconstitute is what allows us safely and selectively to scale back and restructure our forces in-being."¹⁶

2. It serves as a deterrent to would-be aggressors. As stated in the National Military Strategy, "This 'Reconstitution' capability is intended to deter such a power [any potential adversary] from militarizing"¹⁷ The underlying philosophy behind this

¹⁴ Chairman, Joint Chiefs of Staff, The Department of Defense. National Military Strategy of the United States, January 1992, p 7.

¹⁵ The White House, National Security Strategy of the United States. August 1991, p 29.

¹⁶ The White House, National Security Strategy of the United States. August 1991, p 29.

¹⁷ Chairman, Joint Chiefs of Staff, The Department of Defense. National Military Strategy of the United States, January 1992, p 7.

assumption is this: should a potential adversary know that the U.S. has both the capability and the will to reconstitute its military forces when necessary, it will be more reluctant to build up its own forces to challenge the U.S. In this fashion, the potential power of the U.S. could be used, in addition to its active force structure, to safeguard America's freedom.

3. It serves as a basis upon which military planners and government officials can create, justify and implement the long-term policies, programs and doctrine necessary to preserve the freedom of the nation. Author Harold J. Clem wrote:

It is generally recognized that sound national security rests on the ability of a nation to act quickly and decisively in time of crisis -- to muster its people and institutions, and to muster its resources for the common defense. Yet there is ample historical evidence to bear out the truth of the assertion that 'the United States has never adequately and fully planned for a mobilization before it occurred.' . . . In fact, studying that record one is brought to the point of seriously doubting the ability of a *free* society to prepare for war in the absence of an immediate and compelling threat.¹⁸

Thus, the policy of acquiring and retaining the capability to reconstitute its power base acts as the force that compels the U.S. to remain prepared for war even "in the absence of an immediate and compelling threat."

Risk Reduction

The policy of reconstitution is the transition point between two constituencies: those who advocate reducing the U.S. military power base and those who advocate retaining the military at its current state as a deterrent to potential aggressors and as keeper of the peace. This policy supports the argument that the U.S. can retain its ability to protect its national interests at a cost significantly less than what it is now paying. It also supports the argument that the U.S. must devote more resources to the long-term protection of its national interests than would otherwise be justified solely on the basis of current threat.

¹⁸ Clem, Harold J. Mobilization Preparedness. National Security Management Series, Washington, D.C.: National Defense University Press, 1983, p 6.

The security of the U.S. will depend upon how much it is willing to spend on national defense, and how the allocated resources are actually used. In the past, the U.S. made its decisions solely on the basis of perceived threat, consequently reducing its military capability to the point of uselessness after a threat disappeared and rendering its forces unprepared for battle when a new threat emerged. In the future, if the U.S. takes the policy of retaining the capability to reconstitute seriously, not only will it be more difficult for an aggressor to challenge the country's national interests, it will also ensure that the country is prepared to meet emerging challenges as they arise at a cost it can afford.

RESEARCH AND DEVELOPMENT

Today, the United States is in an enviable but delicate situation. With the threat to its national security significantly diminished, it has the opportunity to concentrate its resources on revitalizing its economy and enhancing its prosperity. The government, however, has a responsibility to do this in a fashion which ensures the long-term security of the nation. Recognizing this responsibility, the National Security Strategy of the United States requires that the country "retain the national capacity to reconstitute forces should this ever be needed."¹⁹

The question facing government policy makers and military planners today is:
How can the country retain the capability to reconstitute its forces over a very long period of time, at a cost it can afford, when there are no discernible immediate or compelling threats?

Retention of Power Differential

Throughout the Cold War, the U.S. followed a policy of maintaining its military power on par relative to that of the Soviet Union, its major adversary. The U.S. achieved this parity by developing and fielding "smarter" weapons than the Soviet Union so it would not need as many.

¹⁹ The White House, National Security Strategy of the United States. August 1991, p 25.

Now that the Soviet Union has disintegrated and there are no other identifiable threats of the same magnitude to the U.S., it no longer needs to maintain the same capability. The country needs only to maintain a military strong enough to subdue an adversary that may emerge in the future to challenge its national interests.

Power vs. Inventory

It is very important to distinguish between war-fighting capability and inventory. A military's inventory of weapons is sometimes used as a measure of its capability. As a result, planners who use this assumption discuss reconstitution efforts in terms of restocking an inventory rather than restoring a fighting unit's military capability. This leads to plans and programs that may be unaffordable and which ultimately may not meet future requirements.

Maintaining its superior war-fighting capability relative to any potential adversary is the cornerstone upon which the ultimate success of the country's national security strategy rests. But, maintaining an inventory of today's weapons or the capability to build them may be neither necessary nor sufficient to accomplish this.

The U.S. has two options as it reduces its military and establishes the programs necessary to reconstitute it. The country may choose to retain its inventory of current weapons and the ability to build them in the future to meet an emerging threat. Alternatively, it may choose to depend on acquiring and using weapons designed and built with the most current technology when a future threat emerges.

The second option alleviates the need to retain people, equipment and facilities that are no longer required for day-to-day operations. This option, however, depends on the availability of technologically advanced weapons when they are needed.

The risk to making this choice is that a threat may emerge at a time when there are not yet any newly developed weapons available for production. And, because of its policies, the country may have lost the capability to increase its inventory of even the weapons it had already developed and fielded. This would leave the country in a vulnerable and dangerous position.

Policy Options

The defense establishment can be viewed as an insurance policy for the U.S. and an investment in its future security and prosperity. The elements comprising the establishment depend on the current and projected world situation, just as the elements comprising an investment portfolio depend on the current and projected position of its owner.

People about to retire or already in retirement depend on their investment portfolios for daily survival. They tend to concentrate their investments in low-risk, and therefore, low-payoff instruments such as bank certificates of deposit. Prudent investors also keep a small portion of their portfolio in higher risk, higher payoff instruments, such as stocks, in order to ensure that their investments keep up with inflation.

People who anticipate a long and productive future ahead of them do not depend on their investments for daily survival. They tend to hold more high-risk, high-payoff instruments. The prudent ones, however, also hold some low-risk, low-payoff instruments as a safety net in case their situation changes unexpectedly.

The defense establishment is in exactly the same position. During war, or in anticipation of war, the country depends on the military for its survival. In this situation, the country would like low-risk, low-payoff instruments, such as large stockpiles of current inventory and active production facilities. Prudent managers should also devote a small portion of their resources to high-risk, high-payoff instruments, such as research and development programs and education programs, which could alter the outcome of the war.

During periods of relative peace and stability, the country has a unique opportunity to devote more of its working capital toward enhancing its economic power rather than building up its military power. It also has the opportunity to concentrate a large portion of its defense resources in high-risk, high-payoff instruments, while retaining the low-risk, low-payoff instruments necessary to carry out its daily defense mission, including anticipating and preparing for future threats.

Implementing a national policy to simultaneously reduce the defense budget, retain a defense force capable of defeating any current or anticipated threat, maintain the capability to reconstitute a military force capable of defeating an unanticipated threat that may emerge in the future, and enhance the country's economic power base is an extremely difficult task. Every element of military power and every institution needs to be assessed individually. An example of how one institution can implement a strategy that supports this policy follows.

CD/NSWC STRATEGIC PLAN

The Carderock Division of the Naval Surface Warfare Center (CD/NSWC) is the Navy's premier ship research and development facility -- the largest and most comprehensive in the Western World. Its mission is to ensure that the Navy has at its disposal the latest, most advanced and most cost-effective technologies when designing and developing naval vehicles of all types (sea, land and air), when establishing naval logistics systems and procedures, and when testing and evaluating naval vehicles and systems for use in the fleet. In addition, the Division also conducts programs to assist the U.S. maritime industry in becoming more commercially competitive in the global marketplace.

The Carderock Division traces its origin to congressional legislation passed on January 15, 1896 (HR 4045), which authorized the Navy to "establish a model tank . . . for . . . investigating and determining the most suitable and desirable shapes and forms . . . for U.S. naval vessels . . . [and] . . . for private ship builders . . . provided that the cost be defrayed."

During the 90 years since its inception, the Carderock Division has expanded and contracted its work force and workload numerous times in response to changing requirements. Throughout that period, however, its mission and focus remained relatively stable. As the United States restructures its defense institutions and policies in response to the disintegration of the Soviet Empire and the end of the Cold War, the

mission, focus and, indeed, relevance of the Carderock Division are being examined.

The Navy's shipbuilding budget, which was over \$17 billion in 1988, is expected to be lower than \$5 billion by 1994. By the year 2000, the number of ships in the active fleet will be reduced significantly and the number of sailors required to sail and maintain them correspondingly will be reduced. As a result, the Navy of the future will be considerably smaller than it is today.

With fewer ships in the fleet, fewer ships being designed and constructed, and smaller budgets being appropriated, the current demand for services that the Carderock Division provides will be significantly reduced. If free-market forces are allowed to prevail, the work force and the capacity of the physical facilities at the Division will shrink to a level adequate to supply the current demand. In the process, unique facilities and people with specialized skills may be lost forever. Unused facilities will be disbanded and people whose services are no longer needed will find employment elsewhere.

If, in the future, these facilities and people are no longer needed to help protect the national security interests of the United States, then their departure from the defense establishment is not only acceptable, but is indeed a preferred consequence of the end of the Cold War. By moving to other industries, their knowledge and skills can be used to increase the commercial competitiveness of the U.S. in the global marketplace.

If, however, at some time in the future, the U.S. once again needs to use these people and facilities, losing them now may make it considerably more difficult and more expensive for the Navy to accomplish its mission. Should a new threat emerge which requires the Navy to reconstitute its forces, the vehicle and logistics systems' research, design and development infrastructure would also need to be reconstituted.

As the Carderock Division prepares for the future, it must create and follow a strategic plan that satisfies the requirement to reduce its level of operations as the overall Navy is reduced, while preserving the Navy's ability to reconstitute its forces should the need arise in the future (even if the Navy doesn't have enough money in its current budget to pay for this requirement). A strategic plan which meets these

requirements follows.

Interests

The Carderock Division's interests are defined as those conditions or circumstances, within its sphere of influence, which contribute to the Navy's effectiveness and the country's overall well-being. These include:

- The U.S. Navy is able to accomplish any mission assigned to it with a minimum of casualties and at a cost acceptable to the country.
- The U.S. maritime industry is competitive in the global marketplace.
- U.S. industry overall is competitive in the global marketplace.
- The employees are performing work that is useful to the country and satisfying for themselves.

Objectives

The Carderock Division's primary strategic objective is to be the focal point of the Navy's core science and engineering expertise for ships, logistics systems and maritime systems. The Division also has an objective to identify situations where it can apply its core competencies to support national technological needs (helping U.S. industry compete in the global marketplace) as a means of preserving them for the Navy.

Strategy

In examining how the Carderock Division can structure a strategic plan that supports its interests and objectives, two issues will be discussed: its business base, and the management and affiliation of the Division.

Issue 1 -- Business base

In fiscal year 1992 the Carderock Division's physical facilities were worth approximately \$2 billion. It had a work force of nearly 4,700 employees with a business base of approximately \$700 million. This funding supported work in three primary areas: research and development -- \$300 million, weapons systems acquisition support -- \$150 million, and in-service engineering -- \$250 million. Virtually all of this work was performed for Navy and Department of Defense sponsors. In that year, the Navy's shipbuilding procurement budget was approximately \$9 billion.

Options

As the Navy's overall budget shrinks in the future, the Division's business base will correspondingly decrease. The Division must devise a plan of action to accommodate this shrinking business base in a manner consistent with its stated interests and objectives. Some of the options it has are:

1. Reduce the work force and close facilities when the business base can no longer support them.
2. Secure additional funding from the Navy to retain the unneeded work force and facilities so they will be available in the future if the world situation warrants it.
3. Secure funding by working for alternative sponsors so that the work force and facilities remain employed in a manner consistent with the interests and objectives of the Division thus continuing to be available to the Navy should the need arise in the future.

Analysis

The first option is the smartest choice *if* the Navy is sure the people and facilities will never be needed in the future or if an analysis shows that it would be cheaper and more feasible to reconstitute this infrastructure when it is needed. It may also be a good choice if the government's primary political objective is to reduce the number of federal employees and facilities in the fastest, most efficient way possible.

It is not a good choice if the future is unknown and the possibility remains that a threat will emerge which requires the Navy to reconstitute its forces. Further, it is not a

good choice if unique knowledge, skills or facilities will be lost that affect the Navy's ability to conduct its mission in the future. For example, if the Navy does not need a quiet propeller designed for a submarine this year, the propeller designers would have no work. Following this option, their jobs would be eliminated and they would find employment with another industry. If a new submarine is designed in three years, there would be no one left in the Navy who could design the required quiet propeller.

The second option is the most efficient way of preserving a capability that may be needed in the future, but it is also the most expensive. Following this option, the government would be required to spend money every year to pay for people and facilities that are not contributing to the current operational requirements of the Navy. If the Navy's budget is reduced to a level sufficient to conduct only its current operations, it will not be able to afford this option.

The third option is attractive since it provides a means for the Navy to retain its capability to reconstitute its forces even though it cannot afford to pay any additional costs beyond what is necessary to conduct its current operations. In addition, it supports all of the Division's stated interests and objectives. Following this option requires that the Division perform a significant amount of work for sponsors other than the Navy. The disadvantage of this option is that the staff and management may not be able to identify enough work from other sponsors to support the Division's infrastructure. In addition, the Division may find it difficult to work for new sponsors who have unique cultures of their own and are used to different ways of operating. Another disadvantage of this option is that scarce Navy resources may be diverted to efforts that do not support the Navy's immediate mission requirements.

Suggested Choice

For at least the next ten years, the Carderock Division should choose option three. Since the future is still so uncertain, it would be unwise to disband the unique expertise and facilities until the world situation is more stable. At the same time, however, the Navy cannot afford to pay for this luxury in light of the current national strategy to reduce

the federal deficit. By broadening its business base, the Division can continue to provide services to the Navy and the country at a price the Navy can afford. In addition, the Division's people and facilities remain intact and available to satisfy any emerging Navy requirement in the future.

Today, the Division performs virtually all of its \$700 million worth of work for the Department of Defense. It works on numerous programs with other agencies and organizations, but they represent only a small portion of its overall business base. Over the next three years it should broaden its business base, striving to achieve a customer mix as follows:

<u>Customer</u>	<u>Percentage of Work</u>
Navy	45%
Department of Commerce	15%
Department of Transportation (Coast Guard, Maritime Administration)	15%
Department of Defense (non-navy)	10%
Private Industry	10%
<u>U.S. Government (other)</u>	<u>5%</u>
TOTAL	100%

Navy: The Division should continue to provide the same services it always has to the Navy, but at a reduced level corresponding to the Navy's reduced fleet. In addition, the Division should establish a manager responsible for overseeing its reconstitution responsibilities. This person would ensure that the Division remains prepared to assist the Navy in reconstituting its forces when required.

Department of Commerce: The Division should work closely with the Commerce Department's National Oceanic and Atmospheric Administration, its Technology Administration, and its International Trade organizations. U.S. economic policy is currently being restructured to encourage and promote global trade. The Division's expertise and facilities are able to uniquely contribute to this endeavor.

Over the past few decades, the Navy has spent huge sums of money developing technologies to support its fleet. If tailored correctly, these same technologies could also be used to help U.S. industries. The Division has advanced technology expertise in such areas as materials science, measurements, signal processing, electromagnetics, acoustics, structural engineering, environmental engineering and hydrodynamics.

Working in conjunction with the National Institute of Standards and Technology (NIST), the National Measurement Laboratory, the National Engineering Laboratory, the Institute of Material Sciences, the Export Administration office, the Office of Trade Development and the Small Business Administration, private incubator companies can be set up to commercialize these technologies and introduce them into the global marketplace. Under the auspices of the National Information Technology Center, NIST is already establishing an incubator system for information technology. Because of the close proximity of the two institutions (both in Montgomery County, Maryland), it would be a natural extension of this effort to include technologies available at the Carderock Division.

Department of Transportation: The Division should continue to work closely with the Department of Transportation's Maritime Administration and the U.S. Coast Guard (USCG).

The Carderock Division currently works with the Coast Guard to provide ship design services and recently began a program to help their engineering office make more accurate cost estimates for their future shipbuilding programs, based on the Navy's expertise in this area. The Division also cooperates with the USCG in environmental engineering programs to enhance oil-spill clean up, retard the spread of shipboard fires,

and create shipboard plastic recycling systems. Examples of areas for future cooperation include programs to control the noise ships make (which create hearing impairments for the crews), and programs to assist the USCG in the war against drugs by designing and evaluating instruments that can determine if contraband is hidden behind bulkheads, under decks or in fluid-filled tanks.

The Maritime Administration is responsible for enhancing the commercial maritime industry in the U.S. The Carderock Division is currently working with them in conjunction with the National Shipbuilding Research Program, and has recently taken over management of the program. Its mission is to assist the U.S. shipbuilding and repair industry in achieving and maintaining global competitiveness with respect to quality, time, cost and customer satisfaction. Its goal is to obtain a three percent share of the international shipbuilding market for U.S. companies. Because there was only one commercial ship built in U.S. shipyards in 1992, capturing three percent of the international market would be a significant accomplishment.

Department of Defense (non-navy): The Division should continue to work closely with DOD organizations. It is currently working on numerous programs sponsored by the Defense Advanced Research Projects Agency (ARPA) in the fields of advanced materials, hydrodynamics, acoustics and structural dynamics. In addition, the Submarine Technology Center, created by ARPA, is located at the Division.

ARPA has recently begun creating programs to help commercialize technologies developed by the defense establishment and the Carderock Division should contribute to this endeavor. As of the end of 1992, the Division had in force over 225 patents and over 50 patents pending. It issues an average of 1,500 new technical reports and publishes over 70 articles in refereed technical journals each year. Many of these contain technologies that could be commercialized. The Carderock Division can also assist ARPA (on a program jointly sponsored with the Drug Enforcement Administration) by using its acoustics technology to develop surveillance systems that could locate drug making factories hidden in the dense rain forests.

Private Industry: The Carderock Division can serve both the maritime industry, as its original charter specified, as well as U.S. private industry in general, as authorized by the Technology Transfer Act of 1986²⁰. The Division is pursuing discussions with a U.S. automobile manufacturer to help it evaluate components that will make its cars quieter. Foreign manufacturers advertise that their cars are very quiet. With the aid of facilities and technologies available at the Division (all unclassified), the U.S. manufacturer's cars will be more competitive, quicker, and cheaper than if the company had to wait until it had its own acoustic facilities.

Issue 2 -- Management and Affiliation

The Carderock Division is managed by a Navy Captain (O-6) commanding officer and a civilian (SES) technical director. It is part of the Naval Surface Warfare Center, which in turn is part of the Naval Sea Systems Command -- the organization that designs and buys ships. As articulated in its mission statement, its primary purpose is to provide service to the Navy. Everything else is subordinate to this.

Options

If the Division adopts the strategy of broadening its business base, it should examine its organization and affiliation in order to restructure itself in a fashion that most efficiently serves its new customers. Some of its options are:

1. Remain the same, i.e., a Navy-owned and -operated organization.
2. Become a government-owned (Navy), contractor-operated organization.
3. Become a government-owned (non-Navy), contractor-operated organization.
4. Become a government-owned (Navy), government-operated (non-Navy) organization.
5. Become a government-owned (non-Navy) and -operated organization.
6. Become a privately owned and operated organization.

²⁰ United States Congress. "Federal Technology Transfer Act of 1986," Public Law 99-502, October 20, 1986.

Analysis

Option one is the status quo. It is, therefore, the easiest to implement. Its primary advantage is that it provides the Navy with full control over the daily activities of the Division. There are two disadvantages to this situation. First, the Navy remains totally responsible for the costs associated with maintaining the Division. As the Navy's overall budget is reduced, it will be increasingly more difficult to justify funding this organization at a level necessary to retain its core competencies intact. Secondly, there is the potential that conflicts will arise as management attempts to set priorities among many diverse customers in the new business base. Because the Navy will be in full control, it may tend to skew priorities in a manner not supportable by market forces. Non-Navy customers may therefore be reluctant to enter into working agreements with the Division.

Options two and three may be beneficial since, as a contractor-operated organization, it is easier to attract and retain a qualified work force, and to work with other private organizations. The salary structure is more flexible, and the contracting and accounting rules are less restrictive than those of the government. The Division could be operated by a university, such as Pennsylvania State University or Johns Hopkins University, that has experience managing such institutions. The disadvantage of this situation is that it is more difficult for the Navy and other government organizations to hire the Division. Rather than simply issuing a non-competitive work request as is currently done, legal contracts would need to be negotiated. Also, the span of control by the Navy is severely reduced.

Options four and five are advantageous if the managing agency can enhance the operations of the Division. For example, if the Navy, Army and Air Force research institutions merge, it may be possible to operate more efficiently with less duplication of effort. If the Division merged with the research institutions of the Department of Commerce or Transportation, the same advantage may be gained. In addition, with the Department of Commerce in control, the Division may find it easier to concentrate its efforts on commercializing technology rather than simply developing technology.

Another advantage of these options is that the Navy is no longer responsible for funding and maintaining the facilities, yet they remain available if the Navy needs them (and has the funds to pay for the work).

The disadvantage of these options is that the Navy loses control of the institution and may not get the priority it feels it needs for its projects. Also, the new managing agency would now be responsible for funding the facility thereby incurring additional fiscal responsibilities.

Option six gives full control of the Division to the free-market system. If the organization can profitably survive, it will. If the business is not viable, it will close. This can be advantageous to the Navy because it will only need to pay for the services it uses. This option also reduces the number of facilities the Navy owns and the number of people it employs. The disadvantage is that the Navy loses operational flexibility and control of the organization because formal contracts will be required for all work. There is also a risk that facilities and expertise not needed in the immediate future will be lost, making it more difficult for the Navy to reconstitute its forces in the future.

Suggested Choice

The Carderock Division should choose option five. If handled properly, this option preserves all the flexibility and control the Navy needs, while relieving it of some of the responsibility for the daily upkeep and management of the institution. In addition, it provides the management focus necessary to commercialize its technology rather than simply to develop it. The organizational structure which is most beneficial to the Navy and the country is as follows:

For the next ten years, the Navy should retain title to the property, but transfer the operational responsibility to the Department of Commerce (DOC). Every two years the Navy and DOC should review the organization with a view toward transferring full ownership and control.

The Division should be renamed the National Maritime Technology Center (NMTC) and placed under the jurisdiction of the Under Secretary of Commerce for Technology Administration (USTA). Placing it in this position would ensure its affinity with the National Institute of Standards and Technology.

The National Maritime Technology Center should be managed jointly by a Captain (O-6) from the National Oceanic and Atmospheric Administration's (NOAA's) Commissioned Officers Corps serving as the Commanding Officer and a career Senior Executive Service member serving as the Technical Director. Through a memorandum of agreement, these managers should report directly to USTA while representing the overall interests of the Department of Commerce. This arrangement would ensure that the primary focus of the Center is directed toward enhancing the commercial viability of the United States.

The Navy could retain the control it needs by becoming a tenant activity at the Center -- the David Taylor Model Basin. This activity would be commanded by a Navy Commander (O-5) serving as the Officer-In-Charge (OIC). This billet would be treated in a fashion analogous to a joint service position, with the NOAA Captain acting as the Naval Officer's direct reporting senior. As OIC, the Navy Commander would be responsible for managing all of the Navy's activities at the Center. In this capacity, the Commander also would be responsible for ensuring that the appropriate facilities and work force remain available to support the Navy's reconstitution effort should this be required in the future. Following this process would ensure that the Navy's continuing interests are represented.

The Department of Transportation should assign a U.S. Coast Guard Lieutenant Commander (O-4) to the Center to serve as its Executive Officer. This officer would represent the interests of both the USCG and the Maritime Administration.

During peacetime, the Center operates like any other government research institution. It will get its funds the same way it does now -- by finding a sponsor willing to pay for its services. Under this organizational structure, the Navy can continue to utilize

the services offered by the Center simply by issuing an interdepartmental work request. In addition, any other organization could do the same thing. Thus, the Center would be able to efficiently meet the needs of a large and diverse business base.

If a national emergency is declared by the President, the legal authority and procedural processes already exist to place members of NOAA's commissioned officers corps and the USCG under the direct command of the Navy. Thus, in times of war or other national disaster, the management of the Center could temporarily revert back to the Navy with very little difficulty.

CONCLUSION

The current global political environment is unclear and difficult to assess. The future is incomprehensible and unpredictable. Yet, in spite of this uncertainty, the U.S. defense establishment is being radically restructured. Whole institutions are closing, facilities are being disbanded and people are leaving the defense industry in great numbers and in rapid succession.

Ever mindful that peace is a fragile commodity and must be protected with gentle care and steadfast diligence, the United States has a unique and fleeting opportunity to channel its vast and powerful resources toward enhancing the prosperity of its citizens and the quality of life throughout the world.

After 50 years of fighting the Cold War, the war is over. The United States is reducing its defense spending and turning its attention toward strengthening its economy. The continuum of history, however, teaches us that the war is never over. The day may yet come when this country finds its national security threatened once again. By redirecting its defense-related resources and talents rather than reducing them, the United States can enhance its economic and social prosperity while simultaneously perpetuating the capability to reconstitute its military forces for future generations.